

Mass Population build-up of *Anaphaeis aurota* F. in Oman

(Lepidoptera, Pieridae)

by

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Introduction

I spent most of the month of May, 1981, in Oman at a time when a rapid population build-up of the well-known migrant, *Anaphaeis aurota* F. (WILLIAMS, 1930; LARSEN, 1977a) was under way. Though little or no actual migratory behaviour was observed, it is almost certain that the population explosion would at some stage result in migration. In view of the main objectives of my trip it was not possible to keep the same population of the species under observation for an extended period, but although other observations of mass breeding have been recorded (e.g. GRAVES, 1910; PITTAWAY, 1980) it seems worthwhile to record my experiences.

Observations

On May, 1st I arrived in Rostaq, an oasis on the eastern foothills of the Jabal Akhdar, the main mountain range of Oman. *Anaphaeis aurota* was reasonably common, but despite the availability of *Maerua crassifolia* in large quantities, no evidence of breeding was found. On the following day in the Wadi Sahtan large numbers of caterpillars and pupae were found on *Capparis cartilaginea*. The primary food plant, *Maerua crassifolia* was not investigated because no specimens with foliage were seen. In the light of subsequent observations it seems probable all *Maerua* in the area had been stripped by the larvae of *A. aurota*.

After some days in the coastal strip, where scattered specimens of *A. aurota* were seen, I returned to Rostaq. On the 5th of May I visited the Wadi bani Kharus where, at the entry of the wadi system, I witnessed a minor migration of the species. From 10.00 to 10.50 three specimens a minute crossed a 40 metre wide front. They were flying due north with the typical migrants' disregard for wind conditions and topography. Both sexes were represented. They were passing through a large population of freshly hatched specimens, almost solely composed of males. At 17.30 and the next day no migrants were seen.

Further up the wadi I came across many *Maerua* trees which had been completely stripped of foliage and whose branches were — quite literally — covered with the pupae of *A. aurota*. A few kilometres later I came across multitudes of freshly hatched specimens, almost all male. Thousands agglomerated on the branches of the food plant and on neighbouring *Acacia* trees. Thirty specimens, caught at random, were all male. However, a sample of 119 pupae collected produced a normal sex ratio with the males hatching slightly earlier than the females. The 119 pupae collected on this particular tree appeared to be less

than one percent of the total on a visual estimate. The pupae were striped with black markings; compared to the photo of the pupal form normally found on *Capparis* (LARSEN & LARSEN 1980: 27) 45 % must be described as dark and 45 % as very dark. They were rather well camouflaged though they were sometimes so numerous as to make the twigs on which they were placed appear abnormally thickened. I decided to spend the following day investigating the issue more closely.

Special investigation of Wadi bani Kharus

At the junction of Wadi bani Kharus and Wadi Halhal there appeared to be an „epicentre“ for the species. Dozens of *Maerua* were completely stripped but all the butterflies had hatched before the torrential rains of May 3rd since most of the empty pupa cases had been washed away and no pupae remained. Somewhat further up and down the wadi nearly all *Maerua* were stripped and full of either larvae or pupae. Interestingly, it appeared that each tree carried larvae or pupae at the same stage of development. One tree had medium sized larvae, another full grown larvae and a few pupae, another nearly only pupae and a few full-grown larvae. Even further up the wadi, beyond Istal, females were laying eggs and very young larvae could be found. Here the *Maerua* had their foliage intact so far.

Most of the trees had been able to sustain the large numbers of larvae, but only just. Often the tree was completely stripped of foliage, but only a few small caterpillars were about and a small proportion of the pupae were undersized. In other cases a few branches would still have leaves in the midst of all the bare branches. Only two or three times did I come across trees with no foliage and masses of medium sized larvae. In these cases mass starvation was inevitable since the trees are spaced in such a way that the larvae could not reach fresh food supplies.

In order to get some idea of the quantities involved I selected a small, totally bare, tree for closer investigation. During three hours of hot and unpleasant work I collected 1800 pupae off the tree; as there were some I could not reach and some I overlooked, the tree must have had at least 2500 in all, a very few of which had already hatched. I also found three (!) pupae of *Colotis liagore* KLUG.

Later in the day I made spot checks on about 50 of the several hundred *Maerua* trees in the Wadi. Most of these were larger than the tree I investigated, but the general situation was always the same.

Clearly, then, at least 200 trees with at least 2500 *A. aurota* each, indicates that the lower part of Wadi bani Kharus must have given rise to more than 500,000 individuals during the month of May, 1981. Were the more recent broods at the upper end to be successful, at least a million would be involved in this one wadi system on a conservative estimate.

In the field I found no evidence of predation or parasitism, and dead pupae were very rare. Of the 119 pupae brought back to Rostaq all hatched successfully, except for some which had suffered mechanical damage.

I dissected two males and two females which hatched in Rostaq. The males had fully developed testicles while no fully formed eggs were present in the females. Hatched females were pursued by males immediately and paired readily, though clearly it must be some time before they could commence laying eggs. This would give them time to move from the area where they hatched. I found very few batches of eggs on the trees stripped of foliage.

Additional observations

Fourteen days later I visited the Wadi Muayadin on the way to Sayq on the western slopes of the Jabal Akhdar, a long way by car, but actually only about 25 km from the Wadi bani Kharus in a direct line. At levels of 800 to 1200 m I found the conditions quite similar to those on the other side. Nearly all the plentiful *Maerua* was stripped by larvae and masses of imagines were on the wing. At 2000 m in the *Reptonia/Olea* association (MANDAVILLE, 1977) many specimens could be seen but only a few widely scattered *Capparid* were available as a larval food plant.

During a visit to the Musandam peninsula 350 km further northwest I observed about a score of scattered individuals. The species is almost certainly not a resident in the Musandam area and we did not see it in February and March of 1979. I think the specimens seen must have come from the south, but there are moderate quantities of *Capparid* available in the area.

Finally, scattered specimens were seen on the coastal strip, clearly flying long distances but with no evidence of preference for a specific direction.

Discussion

The observations leave no doubt that an impressive, and probably unusual, population build-up of *Anaphaeis aurota* was under way in the Jabal Akhdar. There is no reason to except that the situation was not the same in the numerous other similar wadis in Oman. The numbers were certainly large enough to provide the type of reservoir necessary for mass migration (I once observed more than 4,000,000 specimens crossing a 30 km front in one day in Kenya (LARSEN, 1977)).

The pattern in Wadi bani Kharus seems to indicate that the build-up works outwards from some sort of „epicentre“, but the speed can be very fast since the species can develop from egg to imago in as little as a week to ten days.

In the lower reaches of the Wadi bani Kharus and throughout the Wadi Muayadin virtually all food supplies had been exhausted and no more would be immediately forthcoming. Most of the population would therefore be faced with either collapse or emigration. Given the well known migratory

behaviour of the species, emigration seems the probable outcome. Any observations on *Anaphaeis aurota* in eastern Arabia, Iraq and Iran during 1981 would be most welcome, as well as later data from Oman.

Whatever the outcome of the Oman population build-up of 1981, it seems clear that what was happening must resemble closely the general nature of the dynamics which are responsible for mass migrations in the species. The observations also show that given suitable conditions, even an area as small as 100 km², can produce the millions of specimens necessary.

The apparent lack of parasitism is interesting. A tempting possibility is that the parasites are quite simply swamped by the pace of the population increase and that it may be reversed later in the season. Observations on the more recent broods in the upper reaches of Wadi bani Kharus would have been most useful.

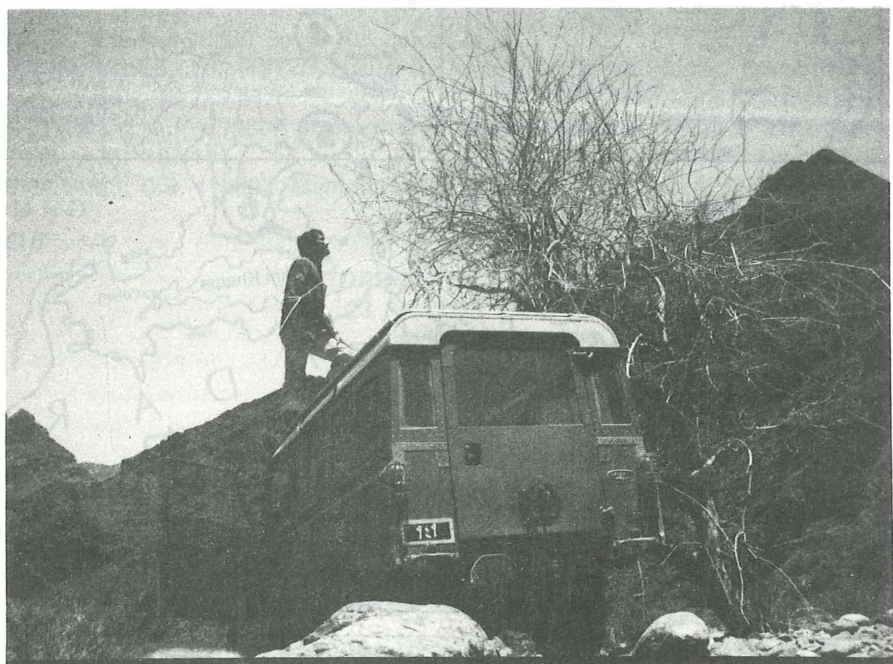
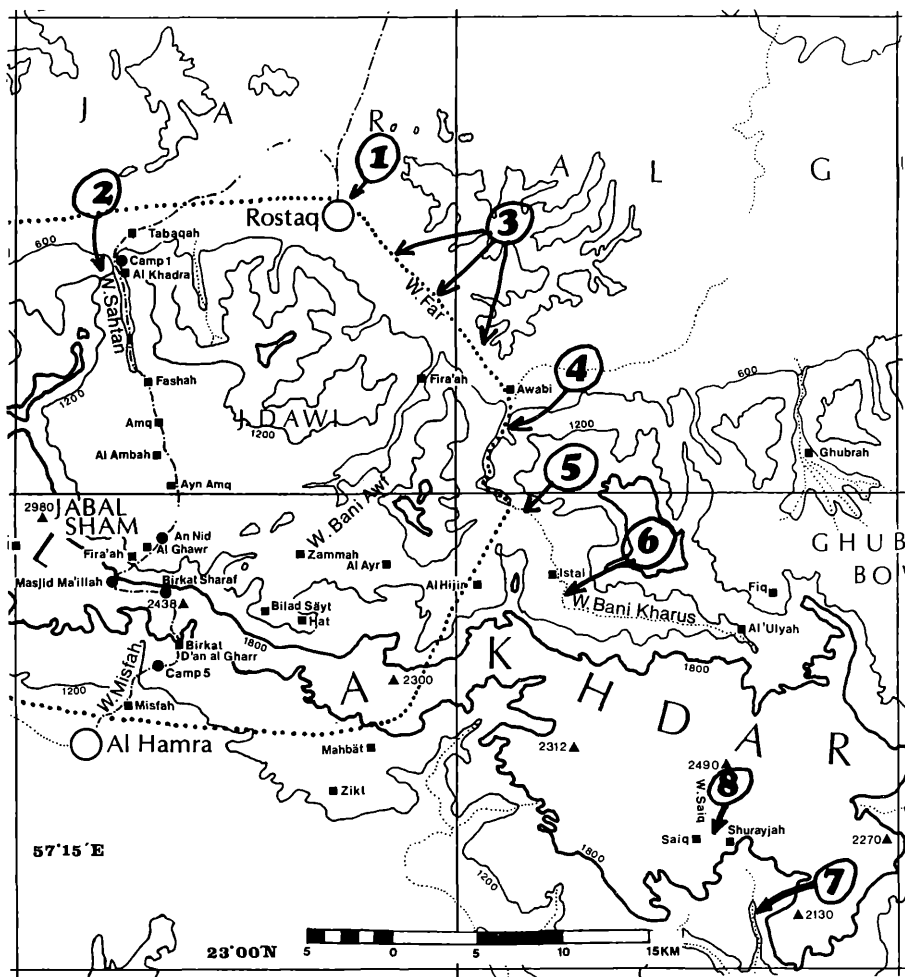


Abb. 1: Sampling a tree totally stripped of foliage by the larvae of *Anaphaeis aurota* (Oman, Wadi bani Kharus, 6.V.1981).

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Map caption

Map of the area in which the population build-up of *Anaphaeis aurota* F. was observed.

- 1) Rostaq, where the species was common, but where no evidence of breeding was yet found although good food sources were available.
- 2) Wadi Sahtan, where the species bred in quantity on *Capparis* and probably *Maerua*.
- 3) Scattered wandering individuals.
- 4) Spot where a moderate migration was seen.
- 5) Epicentre of breeding in Wadi bani Kharus.
- 6) Observations of young larvae and egg-laying females.
- 7) Main breeding centre in Wadi Muayadin.
- 8) Wandering individuals throughout the Sayq region, but no directional movement.